

# PATENT ABSTRACTS OF JAPAN

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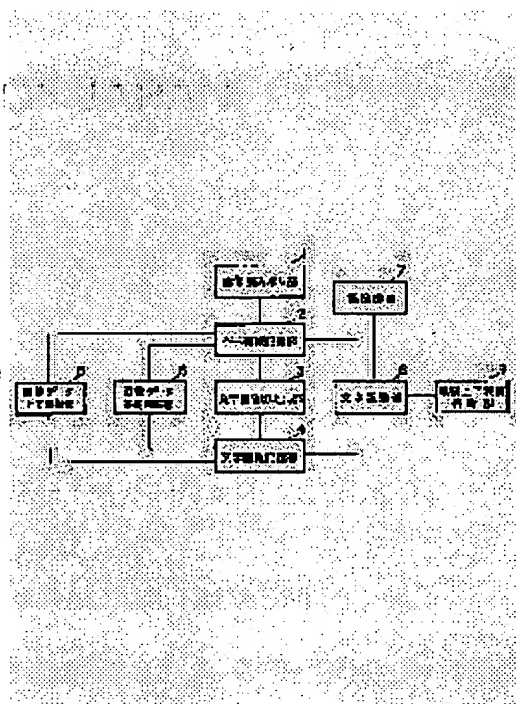
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## (54) CHARACTER RECOGNITION DEVICE

### (57)Abstract:

**PURPOSE:** To provide a character recognition device which can correctly recognize the characters even when an original is set with its vertical direction reversed or the front and the back of a transparent original is reversed.

**CONSTITUTION:** A character recognition device consists of an image reading part 1 which reads the image data, a page image storing part 2 which stores the image data in a single page, a character image segmenting part 3 which segments the image data on a single character from the image data on a single page, a character image storing part 4 which stores the image data on a single character, an image data vertically rotating part 5 which vertically rotates the image data by 180°, an image data upper/rear side turning part 6 which



reverses the front and the back of the image data, a recognition dictionary 7 which stores the feature information on characters, a character recognition part 8 which obtains the candidate characters and the resemblance degree of the image data, and an original vertical and front/back direction deciding 9 for judging in the vertical and front/back direction of the original.

## LEGAL STATUS

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CLAIMS

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[Claim(s)]

[Claim 1] The image reading section for reading image data, and the page image storage section which stores the 1-page image data inputted from said image reading section, The alphabetic character image logging section which starts the image data of one character from the 1-page image data stored in said page image storage section, The alphabetic character image storage section which stores the image data of one character obtained from said alphabetic character image logging section, The image data vertical revolution section which rotates the image data of one character stored in the 1-page image data stored in said page image storage section, and said alphabetic character image storage section 180 upper and lower sides, The image data table flesh-side revolution section which turns over the front flesh side of the image data of one character stored in the 1-page image data stored in said page image storage section, and said alphabetic character image storage section, The candidate alphabetic character of the image data stored in said alphabetic character image storage section with reference to the description information on the alphabetic character stored in the recognition dictionary which stored the description information on an alphabetic character, and said recognition dictionary, and the character recognition section which asks for similarity, The character reader equipped with the manuscript up following table flesh-side decision section which judges the direction of a vertical table flesh side of a manuscript from the candidate alphabetic character for which said character recognition section asked, and similarity.

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page image storage section  
alphabetic character image logging section

information on an alphabetic character

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is the character reader and the thing especially about the pretreatment which obtain alphabetic data from the inputted image data.

[0002]

[Description of the Prior Art] Conventionally, in this kind of character reader, types, such as a newspaper, a journal, and a paper, a dot matrix, hand lettering, etc. were read as image data with optical readers, such as a scanner, and it dissociated a single character every, and was changing and outputting to code information, such as JIS.

[0003]

[Problem(s) to be Solved by the Invention] However, in the conventional character reader, when setting a manuscript in a character reader, unless the sense of the upper and lower sides of a manuscript was correct, character recognition was not able to be carried out correctly. Moreover, unless the sense of the manuscript written to a transparent sheet like an OHP sheet of a front flesh side and the upper and lower sides suited, right recognition of it was not completed.

[0004] This invention aims at offering the character reader which can solve such a conventional problem and can recognize [ the manuscript set in the character reader by vertical reverse, or ] correctly, and a transparent manuscript sheet can recognize correctly a front flesh side, on the contrary even when it is set.

[0005]

[Means for Solving the Problem] This invention adds the image data vertical revolution section which rotates image data 180 upper and lower sides, the image data table flesh-side revolution section which turns the front flesh side of image data over, and the manuscript up following table flesh-side decision section which judges the direction of a vertical table flesh side of a manuscript to the conventional character reader, in order to attain the above-mentioned object.

[0006]

[Function] By the above-mentioned configuration, since it becomes unnecessary for a user to consider the sense of the upper and lower sides of the manuscript set in a character reader and it becomes unnecessary to also consider the front flesh side of a manuscript in the case of a transparent manuscript sheet, this invention can mitigate the burden of the user at the time of a character recognition activity.

[0007]

[Example] Hereafter, one example of this invention is explained, referring to a drawing. Drawing 1 is the functional block diagram of the character reader in one example of this invention. The image reading section for 1 to read image data in drawing 1, the page image storage section which stores the 1-page image data into which 2 was inputted from the image reading section 1, The alphabetic character image logging section which starts the image data of one character from the 1-page image data by which 3 was stored in the page image storage section 2, The alphabetic character image storage section which stores the image data of one character by which 4 was obtained from the alphabetic character image logging

section 3, The image data vertical revolution section which rotates the image data of one character stored in the 1-page image data and the alphabetic character image storage section 4 by which 5 was stored in the page image storage section 2 180 upper and lower sides, The image data table flesh-side revolution section which turns over the front flesh side of the image data of one character stored in the 1-page image data and the alphabetic character image storage section 4 by which 6 was stored in the page image storage section 2, The recognition dictionary in which 7 stored the description information on an alphabetic character, the character recognition section which asks for the candidate alphabetic character and similarity of the image data stored in the alphabetic character image storage section 4 with reference to the description information on an alphabetic character that 8 was stored in the recognition dictionary 7, 9 is the manuscript up following table flesh-side decision section which judges the direction of a vertical table flesh side of a manuscript from the candidate alphabetic character for which the character recognition section 8 asked, and similarity.

[0008] Drawing 2 is the circuit block diagram of the character reader in one example of this invention. For 10, as for read-only memory (it is hereafter called ROM for short.) and 12, in drawing 2, a random access memory (it calls for short Following RAM.) and 11 are [ a central processing unit (it is hereafter called CPU for short.) and 13 ] scanners.

[0009] The image reading section 1 shown in drawing 1 with a scanner 13 the page image storage section 2 and the alphabetic character image storage section 4 By RAM10, the alphabetic character image logging section 3, the image data vertical revolution section 5, the image data table flesh-side revolution section 6, and the manuscript up following table flesh-side decision section 9 By performing the program memorized by ROM11 while CPU12 performed the exchange of RAM10 and data, the recognition dictionary 7. By ROM11, the character recognition section 8 is realized by performing the program memorized by ROM11, respectively, while CPU12 performs an exchange of ROM11, RAM10, and data.

[0010] Hereafter, the character reader in one example of this invention is explained according to the flow chart which shows the actuation to drawing 3.

[0011] In step A, a user reads image data using the image reading section 1 first. The inputted 1-page image data is stored in the page image storage section 2.

[0012] In step B, the alphabetic character image logging section 3 starts the image data of one character from the 1-page image data stored in the page image storage section 2. The obtained data of one character are stored in the alphabetic character image storage section 4.

[0013] In step C, the image data vertical revolution section 5 makes vertical revolution alphabetic character image data from the text image data memorized by the alphabetic character image storage section 4. The image data table flesh-side revolution section 6 makes front flesh-side revolution alphabetic character image data from the text image data memorized by the alphabetic character image storage section 4, and makes the upper and lower sides and table flesh-side revolution alphabetic character image data from this vertical revolution alphabetic character image data.

[0014] In step D, the character recognition section 8 asks for each candidate alphabetic character and similarity from text image data, vertical revolution alphabetic character image data, front flesh-side revolution alphabetic character image data, and the upper and lower sides and table flesh-side revolution alphabetic character image data.

[0015] In step E, each candidate alphabetic character with the biggest similarity that asked for the manuscript up following table flesh-side decision section 9 at step D judges whether it is an unsuitable alphabetic character. In the case of an unsuitable alphabetic character, it returns to step B. When it is not an unsuitable alphabetic character, it progresses to step F.

[0016] In step F, the manuscript up following table flesh-side decision section 9 judges image data with the biggest similarity for which it asked at step D. In the case of text image data, it progresses to step K. In the case of vertical revolution alphabetic character image data, it progresses to step G. In the case of front flesh-side revolution alphabetic character image data, it progresses to step I. In the case of the upper and lower sides and table flesh-side revolution alphabetic character image data, it progresses to steps H and J.

[0017] In step G and step H, the image data vertical revolution section 5 rotates the 1-page image data stored in the page image storage section 2 180 upper and lower sides.

[0018] In step I and step J, the image data table flesh-side revolution section 6 turns over the front flesh side of the 1-page image data stored in the page image storage section 2.

[0019] In step K, the character recognition section 8 carries out character recognition of the 1-page image data stored in the page image storage section 2.

[0020] Hereafter, the situation at the time of recognizing the alphabetic character in one example of this invention is explained in more detail using drawing 4, drawing 6, drawing 7, drawing 8, drawing 9, and drawing 11 R> 1. Drawing 4 shows signs that a manuscript is rotated 180 upper and lower sides. Drawing 5 shows signs that the front flesh side of a transparent manuscript is turned over. Drawing 6 shows signs that a front flesh side is turned over, after rotating a transparent manuscript 180 upper and lower sides. Drawing 7 shows the example of the alphabetic character image obtained by carrying out alphabetic character image logging of the page image data read in the scanner 13. The front flesh-side revolution alphabetic character image which drawing 9 which shows the vertical revolution alphabetic character image obtained by drawing 8 rotating the text image shown in drawing 7 180 upper and lower sides turned over the front flesh side of the text image shown in drawing 7, and was obtained is shown. Drawing 10 shows the upper and lower sides and the table flesh-side revolution alphabetic character image which turned over the front flesh side of the vertical revolution alphabetic character image shown in drawing 8 R> 8, and was obtained. And the result of the character recognition of each image data shown in drawing 7, drawing 8, drawing 9, and drawing 10 is shown in drawing 11.

[0021] The candidate alphabetic character with the highest similarity is "B" as a result of drawing 11 to character recognition. When right and left [ like "A" and "M" ] whose candidate alphabetic character obtained here is are an almost object alphabetic character, "C", it is like [ when the upper and lower sides as shown in "E" are an almost object alphabetic character ] "Z" and "N" -- almost -- a point -- the case where it is an object alphabetic character -- "n" -- it is like "u" -- almost -- a point -- the case where there is an object alphabetic character -- "-- since it is an alphabetic character unsuitable for judging the sense of a manuscript in these cases when there is an almost object alphabetic character like b], "d", "p", and "q", it returns from page image data to the processing which starts an alphabetic character once again.

[0022] The image data with the highest similarity is "the upper and lower sides and a table flesh-side revolution alphabetic character image" as a result of drawing 11 to character recognition. For this reason, the upper and lower sides and a front flesh side judge that it was reversely set by both the manuscripts set to the scanner 13. And since a normal result will not be obtained if character recognition of page image data is performed as it is, after rotating page image data 180 upper and lower sides, a front flesh side is turned over and character recognition is performed.

[0023]

[Effect of the Invention] The image data vertical revolution section which as for this invention rotates image data 180 upper and lower sides so that clearly from the above-mentioned example, Since it has the image data table flesh-side revolution section which turns the front flesh side of image data over, and the manuscript up following table flesh-side decision section which judges the direction of a vertical table flesh side of a manuscript Since it becomes unnecessary to consider the sense of the upper and lower sides of the manuscript set in a character reader and it becomes unnecessary to also consider the front flesh side of a manuscript in the case of a transparent manuscript sheet, a user can mitigate the burden of the user at the time of a character recognition activity.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** The functional block diagram of the character reader in one example of this invention.

**[Drawing 2]** The circuit block diagram of the character reader in one example of this invention.

**[Drawing 3]** The flow chart of the character reader in one example of this invention.

**[Drawing 4]** The mimetic diagram in the condition of having rotated the upper and lower sides of the manuscript in one example of this invention.

**[Drawing 5]** The mimetic diagram in the condition of having rotated the front flesh side of the manuscript in one example of this invention.

**[Drawing 6]** The mimetic diagram in the condition of having rotated the upper and lower sides and the front flesh side of a manuscript in one example of this invention.

**[Drawing 7]** The text stroke image Fig. in one example of this invention.

**[Drawing 8]** Vertical revolution alphabetic character image drawing in one example of this invention.

**[Drawing 9]** Front flesh-side revolution alphabetic character image drawing in one example of this invention.

**[Drawing 10]** The upper and lower sides and front flesh-side revolution alphabetic character image drawing in one example of this invention.

**[Drawing 11]** List drawing showing the relation between the candidate alphabetic character in one example of this invention, and similarity.

**[Description of Notations]**

1 Image Reading Section

2 Page Image Storage Section

3 Alphabetic Character Image Logging Section

4 Alphabetic Character Image Storage Section

5 Image Data Vertical Revolution Section

6 Image Data Table Flesh-Side Revolution Section

7 Recognition Dictionary

8 Character Recognition Section

9 Manuscript Up Following Table Flesh-Side Judging Section

10 RAM

11 ROM

12 CPU

13 Scanner

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**[Translation done.]**

**[Drawing 12]** The upper and lower sides and front flesh-side revolution alphabetic character image drawing in one example of this invention.

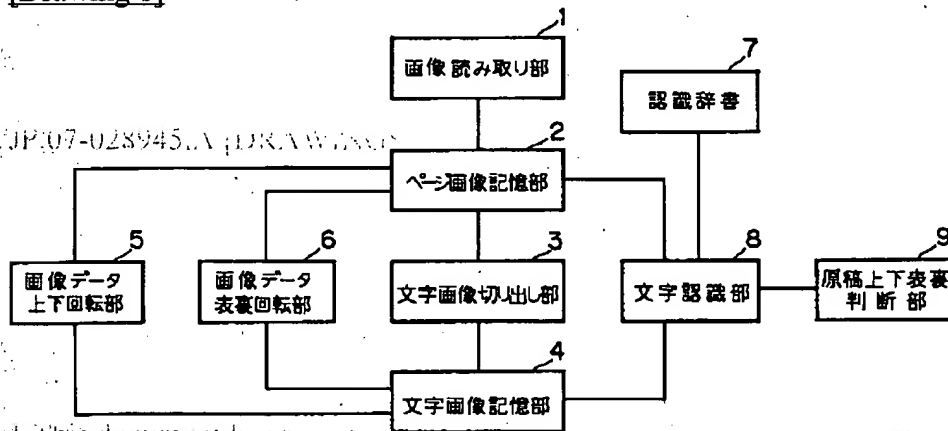
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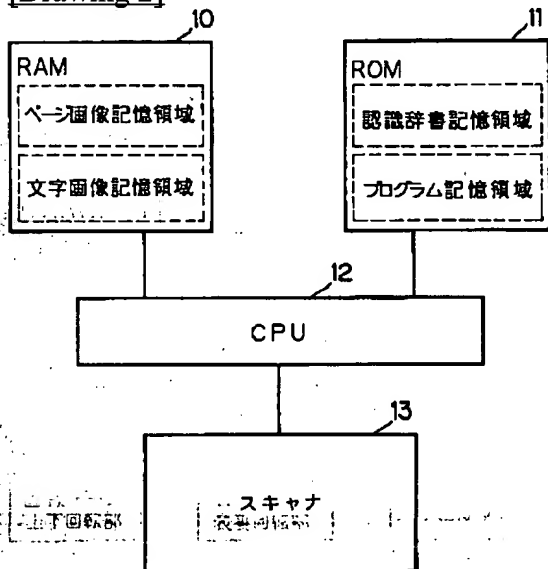
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## DRAWINGS

[Drawing 1]

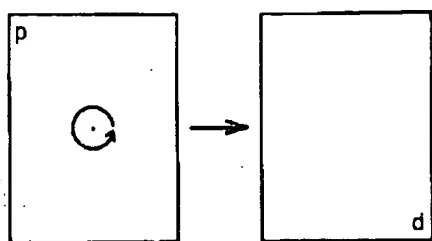
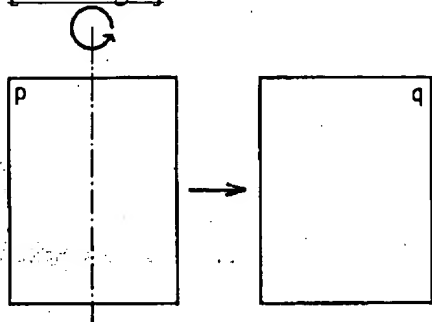


[Drawing 2]



[Drawing 4]



[Drawing 5][Drawing 7]

B

[Drawing 8]

B

[Drawing 9]

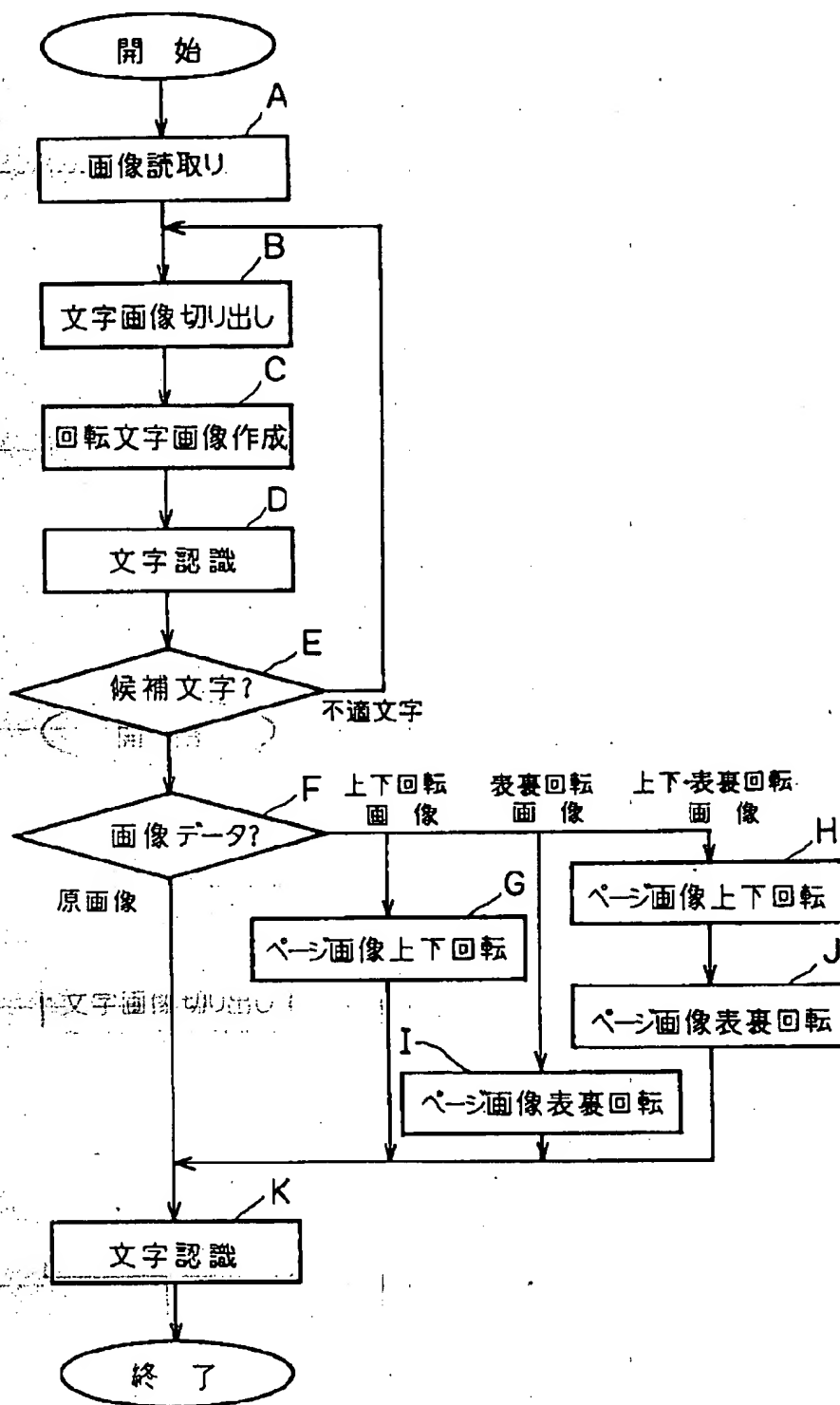
B

[Drawing 10]

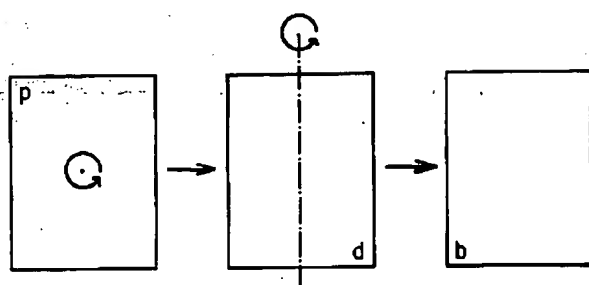
B

[Drawing 3]

B



[Drawing 6]



[Drawing 11]

文字画像	候補文字	類似度
原文字画像	B	0.91
上下回転文字画像	8	0.77
表裏回転文字画像	8	0.71
上下・表裏回転文字画像	B	0.96

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